BLOHM, KAREN, Fugro Robertson Limited, Llandudno, North Wales LL30 1SA,
VIV HARVEY, Fugro Robertson Limited, Llandudno, North Wales LL30 1SA

GIS-based Solutions for Data Analysis and Project Data Management-Recent Advances and Experiences

As a leading provider of petroleum geoscience GIS datasets, Robertson is committed to GIS technology and its successful uptake throughout the industry. To help us achieve this objective, Robertson conducted extensive market research of a wide sample of E&P companies in 2002. Robertson confirmed that GIS usage is currently very variable despite industry acknowledgement that GIS is becoming a mainstream tool and, for a number of organisations, it has been declared a core competence. All to often GIS usage stops at a portal implementation and being an explorationists viewing mechanism or presentation tool for prepared regional data sets. It is Robertson's belief that relatively little geological spatial analysis and value added data creation is being undertaken using GIS software.

To help clients maximise GIS usage, Robertson tackled the above problem from a data management, technology and geological usage perspective. By effectively marrying data portal and geological regional analysis disciplines, GIS toolkits and database solutions that embrace associated workflow requirements have become for client organisations, their "explorationists workstation". The purpose of this paper is to discuss the elements of the "explorationists workstation" and show how collectively they can be used to create a geological product that is the cornerstone of an organisations exploration strategy.

From a geological perspective, an exploration strategy developed from first principles will be rooted in a series of ranked and risked play fairway maps comprising reservoir, hydrocarbon source and migration, seal and trapping elements. These maps are then overlain on a backdrop of licensing, well and seismic data from which opportunities are identified and prospects developed. The "explorationists workstation" allows all the necessary elements to be quickly assembled, analysed and displayed prior to incorporation into the prospect identification and economic modelling stages of the new venture life cycle.

The main elements of the "explorationists workstation" are

Data Collection
Data Management
Data Creation
Data Analysis

By data collection, Robertson means the systematic integration of all data that is useful to explorationists. This is not just limited to seismic and well data located in file and database systems but reports, maps, well charts (core, geochemistry, biostratigraphy etc.) that will exist as hardcopies or digital versions on archive media, file or document management systems as well as a number of GIS datasets that will invariably be file based. The only way to integrate these data sets is to introduce a metadata system that adequately describes the datasets and allows them to be logically searched, retrieved and viewed. The power of any of the data integration technologies

lies in the quality of the metadata system, the ease and accuracy in which it is populated and its subsequent maintenance.

The data management aspect of the solution concerns mainly the workflow associated with the maintenance and population of the metadata data systems not only for the input data but also for intermediate datasets and final products. Another key aspect is the identification and associated management of prime spatial data sets, e.g. well locations, leases, basin outlines, structural elements, etc. Furthermore, portal systems only work effectively if common data attributes (e.g. well names, seismic surveys etc.) can be linked across data sets. As a result, when undertaking portal implementations considerable amounts of data cleanup and attribute harmonisation work is usually performed.

From a play fairway perspective, by data creation Robertson means the generation of individual play elements as fully attributed GIS layers. A key element of this exercise is the allocation of risk polygons to all the modelled geological play elements (risk of reservoir/source/trap presence, thickness, quality, source migration, data confidence etc.). Considerable geoscience input and review is required to achieve a robust and scientifically sound result. The availability of all data through the GIS based portal and the ability to "drill down" to view data enhances the process and improves data confidence.

When all the play fairway elements have been created, they can be analysed using specially developed GIS tools. The process is one of spatially summing individual play elements to create resultant risked play polygons. To impart confidence in the play fairway analysis, the resultant play polygons need to be ground-truthed. This is achieved by reviewing drilling success and fields-in-play distributions. Again specially developed GIS tools allow success polygons to be created, which are reviewed along side the play fairway analysis.

Having used the GIS solution to collect data, manage data and subsequently develop a series of play fairway maps, the next step is to identify prospects and determine financial returns. Here again, GIS is still a key tool as it allows an assessment of shared play risk and the effects of stacked plays to be evaluated.

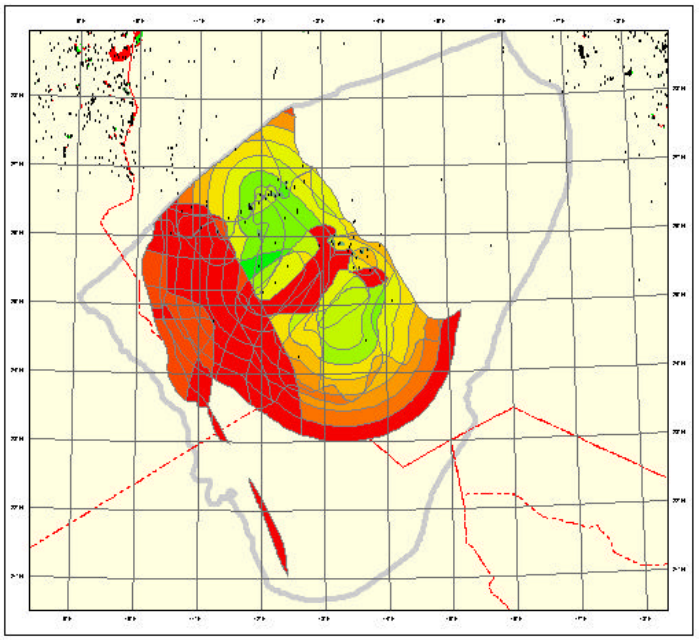

Figure 1: Resultant Play Fairway Analysis of the Murzuq Basin, Libya
Key
Red = High Exploration Risk
Green = Low Exploration Risk